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IS 13016 (1991): Internal Combustion Engines - Radiator Drain Cocks [TED 2: Automotive Primemovers]



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Indian Standard

**INTERNAL COMBUSTION ENGINES —
RADIATOR DRAIN COCKS — SPECIFICATION**

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Price Group 3

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Automotive Primemovers Sectional Committee had been approved by the Transport Engineering Division Council.

Radiator drain cocks are integral part of a radiator and play a significant role in the efficient functioning of the radiator.

This Indian Standard forms an important adjunct to IS 7611 : 1975 'Automotive — radiators — copper brass core construction'.

Indian Standard

INTERNAL COMBUSTION ENGINES — RADIATOR DRAIN COCKS — SPECIFICATION

1 SCOPE

1.1 This standard specifies dimensions, test requirements and other parameters for drain cocks used in radiators.

2 REFERENCES

2.1 The following Indian Standards are necessary adjuncts to this standard:

IS No.	Title
196 : 1966	Atmospheric conditions for testing (<i>revised</i>)
319 : 1974	Free cutting brass bars, rods and sections (<i>third revision</i>)
513 : 1986	Cold-rolled low carbon steel sheets and strips (<i>third revision</i>)
554 : 1985	Dimensions for pipe threads where pressure tight joints are required on the threads (<i>third revision</i>)
2102 (Part 1) : 1980	General tolerances for dimensions and form and position: Part 1 General tolerances for linear and angular dimensions (<i>second revision</i>)
2500 (Part 1) : 1973	Sampling inspection tables: Part 1 Inspection by attributes and by count of defects (<i>first revision</i>)
4218 (Part 1) : 1976	ISO Metric screw threads : Part 1 Basic and design profiles (<i>first revision</i>)

3 TERMINOLOGY

3.1 Terminology shall be in accordance with Tables 1 and 2.

4 TYPES

4.1 The radiator drain cock shall be of two types. Type 1 shall conform to Table 1 and Type 2 to Table 2.

5 DIMENSIONS

5.1 Dimensions shall be in accordance with Tables 1 and 2. The threads of Type 1 drain cocks shall conform to IS 554 : 1985. The Type 2 drain cocks shall have threads conforming to IS 4218 (Part 1) : 1976.

6 MATERIAL

6.1 Material shall conform to the following:

Component	Conforming to
Body, Spindle	Type II, Brass, Half hard, IS 319 : 1974
Handle	Type I, Class D of IS 513 : 1986
Bush	Type II, Brass, Half hard, IS 319 : 1974

6.2 Type 2 drain cocks shall be made from suitable plastics capable of withstanding a temperature of 120°C and pressure of 200 kPa (2 kgf/cm²). The sealing ring shall be made from suitable nitril rubber. A recommended composition is of Butadiene (55%) and acrylonitrile (45%).

7 WORKMANSHIP AND FINISH

7.1 The drain cocks shall be free from burrs, loose scales or sharp edges. A protective coating against corrosion shall be given as per the agreement between the manufacturer and the purchaser.

8 TEST REQUIREMENTS

8.1 The following tests shall be carried out on drain cocks:

- a) Visual,
- b) Leakage test,
- c) Torque test for the handle, and
- d) Ageing test (for non-metallic type).

8.2 Visual

The drain cocks shall be finished smooth. The cross holes shall allow full flow with the cock fully open.

8.3 Leakage Test

When subjected to a pressure of 200 kPa (2 kgf/cm²) at a temperature of 95±5°C the drain cocks shall not show any leakage.

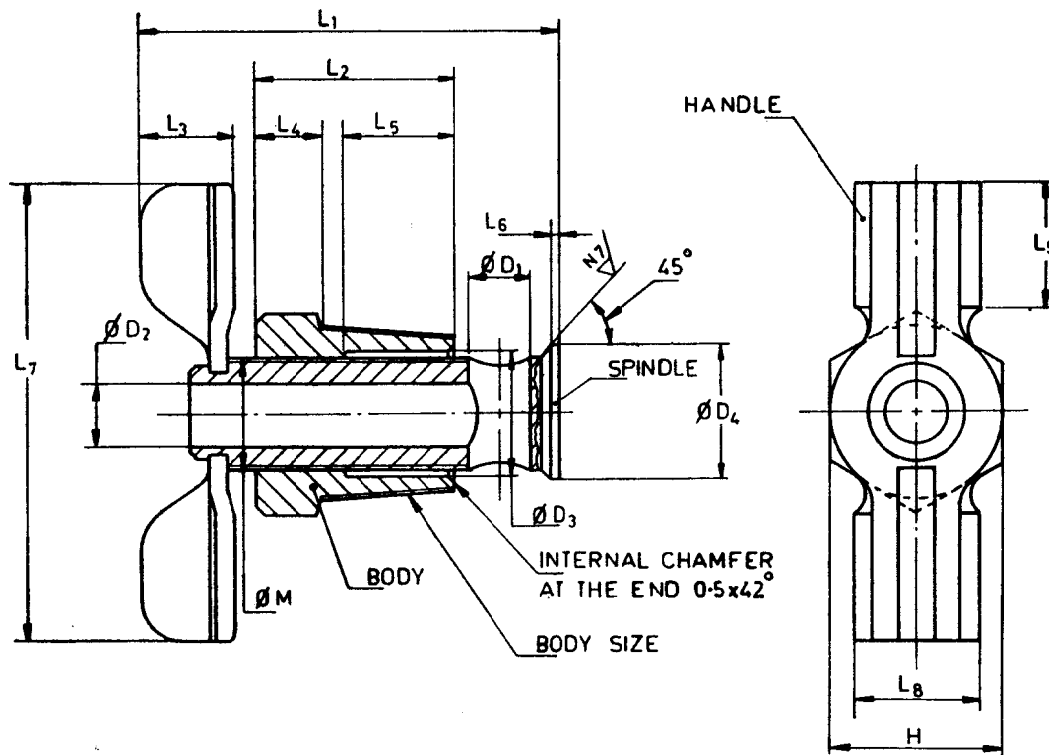
8.3.1 When a sealant is used for fixing drain cocks to the bush, the sealant shall be capable of withstanding a test pressure equal to 1.5 times the working pressure.

8.4 Torque Test

When tightened to a torque of 23 to 40 cm. kg (corresponding to 1 kg/cm² air pressure) there shall be no leakage. The handle shall withstand 40 cm. kg torque.

Table 1 Radiator Drain Cock, Type 1
(*Clauses 3.1, 4.1 and 5.1*)

All dimensions in millimetres.



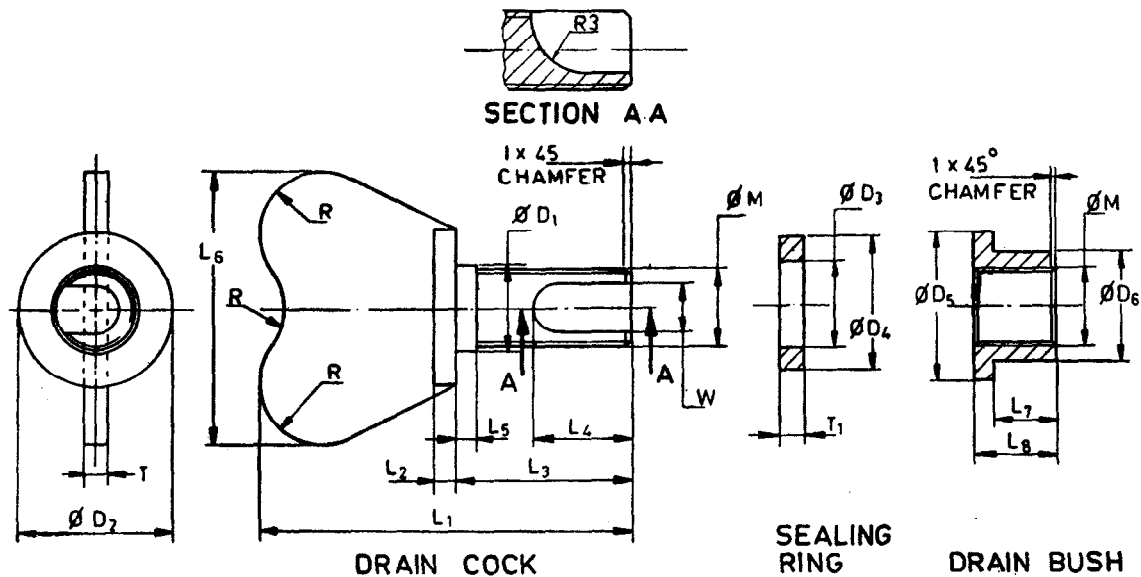
Body	L_1	L_1	L_2	L_1	L_5	L_6	L_7	L_8	L_9	ϕD_1	ϕD_2	ϕD_3	ϕD_4	H	M L.H. Thread
$Rp \frac{1}{4}$	35	16	6	5	8	1	35	10	10	5	5	8.5	10	14	$M 8 \times 0.75$
$Rp \frac{3}{8}$	40	20	6	8	10	1	35	10	10	7	7	10.5	12	18	$M 10 \times 1.0$

NOTE— Unless otherwise specified tolerances as per IS 2102 (Part 1) : 1980.

Table 2 Radiator Drain Cock, Type 2

(Clauses 3.1, 4.1 and 5.1)

All dimensions in millimetres.



M Thread	Drain Cock											Sealing Ring			Drain Bush			
	L ₁	L ₂	L ₃	L ₄	L ₅	L ₆	ϕD_1 +0 -0.1	ϕD	W	R	T	T ₁ +0.5 -0	ϕD_3 +0.1 -0	ϕD_4 ± 0.2	ϕD_5	ϕD_6	L ₇	L ₈
M 10×1.25	50	3	25	15	2.5	35	11	20	6	8	3	3	11	17	19	14	8	10.5
M 14×1.5	60	3	35	25	2.5	35	15	25	10	8	3	3	15	21	22	18	8	10.5

NOTE — Unless otherwise specified tolerances as per IS 2102 (Part 1) : 1980.

8.5 Ageing Test

When subjected to an ageing test as per Annex A, the plastic drain cocks and the sealing ring shall be within the permissible limits recommended by the manufacturer. The property retention percentage against time and temperature shall be plotted as shown in Fig. 1 and 2.

9 PERFORMANCE REQUIREMENT

9.1 The water flow through the drain cocks, when fully open shall be free and continuous.

10 MARKING

10.1 Each drain cock shall be legibly and indelibly marked with indication of the source of manufacture, serial number, month and year of manufacture.

11 SAMPLING

11.1 Unless otherwise agreed upon between the purchaser and the supplier, the sampling inspection tables shall be in accordance with IS 2500 (Part 1) : 1973. All radiator drain cocks of same type, size, and same material and manufactured under similar conditions shall constitute a lot for sampling purposes.

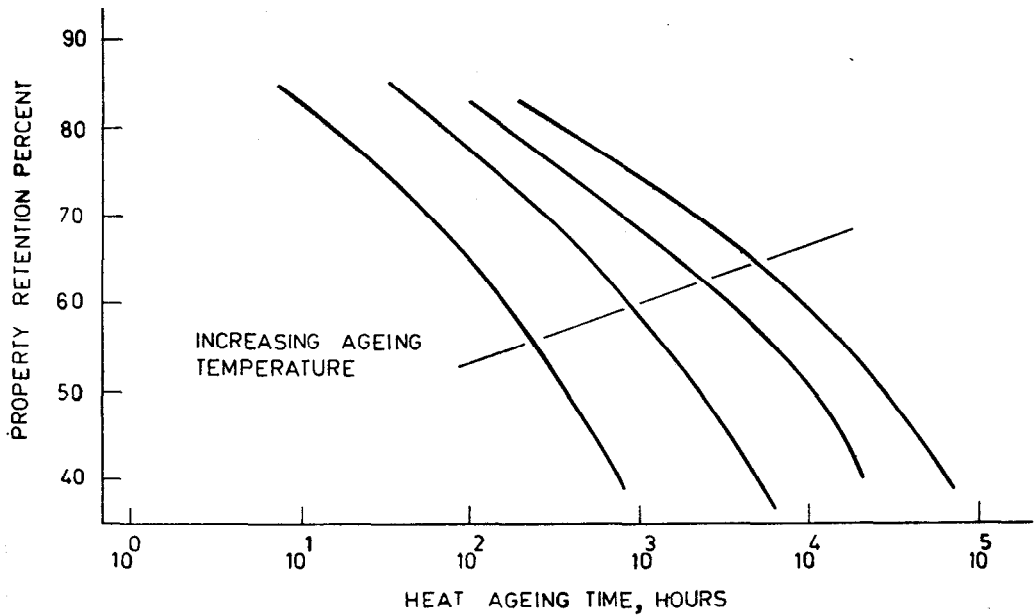


FIG. 1 HEAT AGEING CURVES — PROPERTY RETENTION VERSUS AGEING TIME

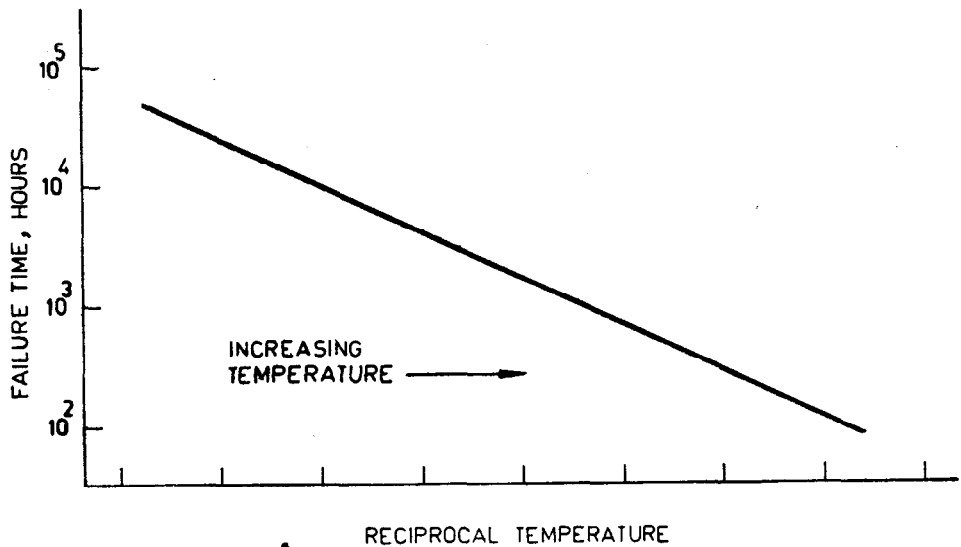


FIG. 2 PROPERTY RETENTION VERSUS RECIPROCAL TEMPERATURE

ANNEX A (Clause 8.5)

AGEING TEST FOR PLASTIC COMPONENTS

A-1 AGEING TEST

A-1.1 Scope

This test is carried out to assess the ageing properties of non-metallic components of drain cocks.

A-1.2 Apparatus

The recommended apparatus consists of a controlled horizontal or vertical air flow oven, employing forced draft circulation with substantial constant fresh air intake and the necessary recording instruments.

A-1.3 Test Specimen

The test specimen shall be comparable to but not greater than the minimum thickness of intended application.

A-1.3.1 The method of specimen fabrication shall be the same as that of the intended application.

A-1.4 Conditioning of Test Specimen

Test specimen less than 7 mm in thickness shall be conditioned at standard atmospheric conditions according to IS 196 : 1966 for at least 40 hours immediately prior to the testing. Specimens above 7 mm in thickness shall be conditioned for at least 88 hours immediately prior to commencement of test. Adequate air circulation shall be provided on all sides of the test specimen.

A-1.5 Test Procedure

A-1.5.1 Select exposure temperature such that the time-to-failure versus temperature curve may be measured for the time of interest or for the life of the intended application. Where the measurements are being made to obtain general information such as material rating, it has been found that testing should be conducted at a minimum of four temperatures. The lowest temperature selected should produce a failure of time of approximately 9-12 months. The next higher temperature selected should produce failure at approximately 6 months. The third and fourth temperatures should produce failure times of approximately 3 months and 1 month, respectively. When possible, select the exposure temperatures from Table 3. If the suggested heat ageing times given above are followed, then the exposure time schedules A, B, C and D may be used.

A-1.5.2 The purpose of Table 3 showing time schedules at specific temperature is to show a typical heat ageing schedule for a particular property of the same material. In practice, it is

often difficult to estimate the effect of heat ageing before obtaining some test data. Therefore, it is usually necessary to start only the short term ageing at one or two temperatures until some data is obtained to be used as a basis for selecting the remainder of the heat ageing temperatures.

A-1.5.3 Expose the remaining test specimens for the selected time intervals at the prescribed temperatures. Following exposure, condition these specimens in accordance with established procedure before testing.

A-1.6 Calculations

A-1.6.1 Plot average values determined for data gathered for each time and temperature in accordance with Fig. 1 and 2. Prepare property retention curves for at least four temperatures in accordance with Fig. 1. In this plot, the abscissa is in logarithmic time scale, while the value of property as the ordinate.

A-1.6.2 Prepare time-temperature curves by plotting the reciprocal of absolute temperature of exposing ($1/T$) on the abscissa and the logarithmic failure time on the ordinate. The failure criteria shall be selected so as to be meaningful in terms of the end use of applications where it is desirable to use the data in selecting materials or predicting service. However, for general ranking of materials, it has been found useful to arbitrarily select the time at which the property of interest is reduced to 50 percent of its original numerical value.

A-1.7 Test Report

Shall contain the following:

1. Material and type of plastic subjected to exposure along with specimen preparing procedure.
2. Pre-conditioning and post-conditioning procedures.
3. Test methods utilized for evaluation of each property.
4. Observation of any visible changes in test specimen.
5. Type of oven used.
6. Exposure temperature utilized and time.
7. Mean and standard deviation of each reported property for each exposure.
8. Curves derived in accordance with A-1.6.
9. Temperature corresponding to a specific exposure time for each property evaluated.
10. Failure criteria expressed as percent reduction of the imaged value for the property of interest.

Table 3 Suggested Temperatures and Exposures Times for the Determination of Heat Ageing Properties
(*Clauses A-1.5.1 and A-1.5.2*)

Exposed Temperature	Reciprocal Temperature in Degrees Absolute $1/T \times 10^3$	Estimated Limiting Temperature t_s										
		40	55	70	85	100	115	135	155	180	210	240
50	3.09	A										
70	2.91	B	A									
90	2.75	C	B	A								
105	2.64	D	C	B	A							
120	2.54		D	C	B	A						
130	2.48			D	C	B	A					
155	2.34				D	C	B	A				
180	2.21					D	C	B	A			
200	2.11						D	C	B	A		
225	2.01							D	C	B	A	
250	1.91								D	C	B	A
275	1.82									D	C	B
300	1.79										D	C
325	1.67											D

Suggested exposure times : A — 3, 6, 12, 24, 48 weeks; B — 1, 3, 6, 12, 24 weeks;
C — 6, 12, 24, 48, 96 days; and D — 2, 4, 8, 16, 32 days.

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